DELIVERABLE D4.2

Grant Agreement: 824350
Project acronym: OSCAR
Project title: *O*pen *S*cien*C*e *A*eronautic & Air Transport *R*esearch
Funding Scheme: Coordination and support action
Start date of project: 2019-01-01
Duration: 30 Months

Date of latest version of Annex I against which the assessment will be made:
V.1.0.0 dated 2018-11-08

Roadmap for developing an open science code of conduct

Due date of deliverable: 2019-11-30
Actual submission date: 2020-08-28
Deliverable version: Final V.1.0

Lead partner for this deliverable: Fraunhofer IRB
Lead partner for the related work package: Fraunhofer IRB

Name, title and organisation of the scientific representative of the project's coordinator:
Dipl.-Ing. Gerhard Pauly
Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM
Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung e.V.

Project co-funded by the European Commission within Horizon 2020, the EU Framework Programme for Research and Innovation (2014-2020)		
Dissemination Level		
PU	Public	✓
CO	Confidential, restricted under conditions set out in Model Grant Agreement	
CI	Classified, information as referred to in Commission Decision 2001/844/EC.	

Acknowledgement:

Many thanks to Tina Klages, Marie-Claire Coët, Cécile André and Valérie Hachette, who have contributed to this deliverable.

Report Approval Status

	Name	Organisation Short Name, Department, Function	Date	Signature	Comments
	Martin MAGA	Fraunhofer IRB	2020-07-29		
Author(s)	Agnes GRÜTZNER	Fraunhofer IRB	2020-07-29		
Approval(s)	Gerhard PAULY	Fraunhofer IFAM	2020-08-28		
Authorization(s)					

List of Distribution

Name	Organisation Short Name, Department	Date	Type of Distribution[1]	Distributed Report Parts[2]		
				Cover Page and Summary[2]	Main Report[2]	Annexes[2]
All researchers of the OSCAR consortium who access the OSCAR Content Server			D	X	X	X
EC Services via the relevant portal (currently the funding & tender opportunities portal)			D	X	X	X

Explanation of notes and list of distribution:

[1] Type of Distribution: please use only the following codes

S = Originally signed print-out

P = Paper copy

D = Digital file

[2] Distributed Report Parts: please cross mark if applicable

Cover Page and Summary

Main Report = The whole report including cover page and summary with details, but no annexes or appendices

Annexes = All annexed separate documents

Content list

1 Summary

1.1 Synopsis

This document is part of the OSCAR project (Open ScienCe Aeronautic & Air Transport Research). The main aim of the OSCAR project is to pave the way for open science in the European Aeronautic and Air Transport (AAT) research landscape. For more information on the project, its WPs, deliverables and results please see the OSCAR project description and other project documents available at the official website of the project: https://oscar-h2020.eu/.

Deliverable D4.2 outlines a potential roadmap to an open science code of conduct suitable to the AAT research community. It focuses on challenges, legal and contractual constraints and opportunities for implementing open science in the European AAT research landscape.

This document has the following five core sections:

- Section 2 gives an overview over the OSCAR project and its main goals and its structure. The sub-section 2.4 is dedicated specifically to work package 4 (WP4) which is dealing with the development and implementation of the OSCAR open science code of conduct.
- Section 3 summarises the contents of work package WP2 and WP3 and highlights the main conclusions and key results of each corresponding deliverable D2.1, D2.3, D3.1 and D3.2.
- Section 4 presents the identified key challenges and key opportunities, the key recommendations for action derived from the results of WP2 and WP3 with focus on the legal and contractual framework of the implementation of open science in the European AAT research landscape.
- Section 5 addresses the delay of D4.2 and shows critically the quality of the result achieved.

1.2 Objective and background

One of the main goals of work package 4 (WP4) is to develop an open science code of conduct for the European AAT research landscape. For this purpose, preparatory work had to be done to explore and define the appropriate content and structure of the open science code of conduct. Furthermore, it is important to have a concise and comprehensive roadmap that lays out all the necessary steps, activities and milestones. Based on our early planning at the beginning of the OSCAR project and based on insights from D4.1 we were able to develop such a roadmap. The key elements of this roadmap to OSCAR code of conduct are presented in D4.2 at hand.

1.3 Key results and conclusions

The work on the roadmap for the OSCAR open science code of conduct started at the beginning of the project. Based on the proposal and previous project findings so far, the general roadmap was depicted in a Gantt chart, timetables and task breakdown structures. The Gantt chart shows the critical paths of the development of the code of conduct. The current roadmap provides specific recommendations for action and implications on further steps in the development phase of the code of conduct, including additional content and strategical information taken from D4.1.

The roadmap includes a maintenance workflow and update pattern for the OSCAR open science code of conduct that takes into account the specific requirements of the European policy making workflows.

Further recommendations for action for the further development of the OSCAR open science code of conduct have been identified:

1. Identification and incorporation of lessons learned by other code of conduct projects.
2. Identification of and commitment to best practices using de facto standards of existing code of conduct projects.
3. Input to the general OSCAR communication strategy (WP6) which considers the specific modalities of the European AAT research landscape including additional information material like fact sheets and templates to support the AAT community in implementing open science in concrete projetcs.

All media and files including spread sheets and image files in full resolutions used in this document are available in the media.zip file in the attachment of this document.

2 Overview of the OSCAR project

2.1 Project description

The transport sector is a fast-growing sector of Europe and is associated with a wide range of economic and societal benefits – acting as a catalyst of technology transfer to many fields of mainly industrial application and vice versa taking up technologies from other sectors.

Today, the transport sector is confronted with diverse challenges: climate change, CO2 emissions, dependency from fossil fuels, evolving mobility demands, increasing global competition, emergence of new enabling technologies etc.

The transport sector as such is usually categorized by transport modes (car, road transport, rail, maritime, and aeronautics) and is characterised by the production and the operation of transport equipment. Additionally, both production and operation of transport infrastructure, as well as aspects of inter-modality of transport, need to be considered.

In this context, open science is considered as an important and promising opportunity to support the intended performance gain and innovations: “open science, open innovation and open to the world – the so-called 3 O’s – are very likely to impact European innovation performance, growth and international competitiveness” (European Commission 2016b).

Traditionally intellectual property rights (IPR) management focuses on keeping intellectual property under lock and key. The basic idea of traditional IPR management is to allow a company to use the competitive advantages gained through secret i.e. non-disclosed research and innovation to gain an advantage over its competitors in the market, via patents and licenses.

One of the basic principles of open science is to open up the scientific process as much as possible and thus to open up the intellectual property associated with the same scientific process. The basic idea of open science is to make knowledge and other intellectual assets freely available to the scientific community and society for reasons of fairness, good scientific practice, reusability and responsibility towards society. It is important to note that even if you share your knowledge freely with the scientific community or with society, you are *not* giving up your copyrights to a creation. The creator retains all her rights to her creation in any case, even if she shares it freely with others, for example by placing it under a free license such as a Creative Commons license (Creative Commons 2020).

It is fair to say, that conventional IPR management and open science are in a state of tension. If traditional IPR management and open science principles are described in generic terms, one could assume or perceive that open science and conventional IPR management contradict each other. Yet, it is important to note that open science and conventional IPR do *not* contradict each other, because they are completely distinct categories. In fact, open science and conventional IPR management can be well harmonized because there are *no logical or conceptual barriers* to this.

For example “while open access to research data […] becomes applicable by default in Horizon 2020, the Commission also recognises that there are good reasons to keep some or even all research data generated in a project closed.” (European Commission 2020c)

The European Commission endorses the principle *as open as possible, as closed as necessary* "and focuses on encouraging sound data management as an essential part of research best practice." (European Commission 2020c)

European AAT research covers the scale of (TRL) from level 1 to level 6 (EARTO 2014). Arguably, the TRLs within a project are important factors influencing how much research can be opened up. The more fundamental research is done, the more this research can be opened up. The more applied industry-related research is done, the less the research process can be opened up. Therefore, for the implementation of open science all aspects of the nature of each individual project needs to be considered.

When implementing open science in European AAT research in general, reasonable compromises between closing and opening the respective project contents must be found. In doing so, special attention must be paid to the respective TRL of the respective project, because TLRs provides a good interface base to decide where, how and when which assets can be opened.

The OSCAR project aims to resolve this perceived tension between open science and traditional IPR management in the AAT research sector and to harmoniously integrate both approaches. OSCAR addresses the issue of the current perception, acceptance, and implementation of open science in the field of European AAT research.

The main goal of the OSCAR project is to initiate and deliver optimized open science opt-in, opt-out or hybrid models for the European AAT research landscape. This requires an in-depth understanding of open science (principles, application, and benefits) as well as of the structure of the European AAT landscape. It also requires to convince stakeholders open science and to guide them through the integration of open science in their daily research work beyond single European projects.

2.2 Project structure

In order to realize the main goal and the related sub-goals of OSCAR, we need to have (1) detailed understanding of the level of awareness and acceptance of open science in AAT research, (2) to develop and adapt implementation approaches for open science and (3) to evaluate those approaches. While these three objectives provide tools and practical information to implement open science in AAT research projects it is also necessary to raise the motivation to implement open science within the AAT research community.

- **Objective 1, WP2, WP3**: An assessment of the development of open science in European AAT projects since the beginning of FP7, i.e. FP7 and Horizon 2020, considering also the AAT related JTIs Clean Sky and SESAR. To some extent, projects, which relate at least partly with core AAT research, have been considered. The assessment shall have been based on:
  - a statistical analysis of estimated 1500+ collaborative research respectively CSA projects. It should have revealed factors facilitating respectively hampering the acceptance of open science approaches;
  - an intense consultation phase with researchers and administrative or legal staff from industry (IND) including SME, research organisations (REC), universities and academia research (HES) to gather comprehensive first-hand experience about

awareness of open science as such, perceived benefits and drawbacks of the idea and potentially concrete examples.
  - However, during the implementation of OSCAR legal constraints prevented accessing the needed EU eCORDA database, thus the statistical analysis had to be replaced by other means in order to identify suitable target projects.
- **Objective 2, WP4**: Objective 2 is to develop an open science code of conduct that is tailored to the needs of the European AAT research landscape. This includes analysing current legal constraints and opportunities as well as implementation approaches of open science into the European AAT research landscape.
- **Objective 3, WP5**: Objective 3 is to test the (interim) results in the course of WP4, to finalise recommendations targeting legal aspects and to validate the related open science code of conduct by simulating the application of the code of conduct in pilot project cases.
- **Objective 4, WP6**: Objectives 1 to 3 will contribute to increase of the implementation of open science in the European AAT research landscape. However, to achieve the ambitious goal of OSCAR, the acceptance of the idea as such, as well as open science code of conduct is crucial. Different complementary communication measures will be conducted to maximise the intended acceptance of and support for open science in AAT research landscape.

2.3 Project steps

OSCAR achieves its goals in three consecutive steps:

2.3.1 Step 1: Information and opinion gathering

As a first step, the OSCAR consortium analysed the European AAT research landscape with respect to the awareness and the perception of open science. We have focused on collaborative research projects (FP7: Level 1 and Level 2, Horizon 2020: Research and Innovation Actions, Innovation Actions) and Coordination and Support Actions as most common instruments in AAT research. As mentioned before, the intended statistical analysis could not be performed (no access to eCORDA) thus another approach on based of the professional experiences of the consortium members had to be developed.

In AAT, most research consortia consist of:

- Industry (IND incl. SME; from OEMs and the whole supply chain, represented by the IMG4 group);
- Research establishments (REC, represented by EREA);
- Academia research (HES, represented by EASN);
- In some cases, other types of partners as e.g. public bodies (PUB).

Some project consortia allow to distinguish between more research driven and more application driven projects, although there will be a level of uncertainty. There is also some tendency to associate lower TRL with the Framework Programmes and being driven by REC and/or HES. Vice versa higher TRL may be associated with some projects in Clean Sky with more emphasize in the role of IND, which might affect the degree of openness.

One main concern about open science and open access in particular is less the concept itself rather than the way it is implemented by the European Commission through the Rules for

Participation (RfP). First, in HORIZON 2020 there is no differentiation of the IPR and open access rules with reference to the TRL or the nature of projects and there are no specific rules applicable to public or private partnerships as well and it will probably remain so in HORIZON EUROPE. Currently, there is one single regime that apply to all situations, even where the difficulty of conciliate openness and projects with industrial partners is greatest. To minimize this difficulty, with the objective of better acceptability and understanding of the open science approach, it would be necessary to be able to apply slightly different and adapted open science rules, depending on the type of project. Secondly, rules applicable to open data are unclear especially about the types of tools or platforms to manage and share research content openly and freely. It creates uncertainty and reluctance to share data.

One of the aims of OSCAR is to offer suggestions for more exact and diversified guidelines on how to implement IPR rules in coherence with open science.

The taxonomy of ACARE mentions in total 12 technical fields as Flight Physics, Aero-structures, Propulsion etc. which need to be dealt with in order to achieve the FlightPath 2050 goals. During FP7 the European Commission introduced the first elements of open science – namely open access and later the open data pilot. Open access became mandatory in Horizon 2020, while open data remains a pre-set option, but consortia may opt out.

Since the beginning of FP7 respectively Clean Sky estimated 1500+ AAT research projects have been started. Considering the publication of calls and the usual project duration there are likely permanently 100 to 200 collaborative projects running in parallel. One can expect that clustering of projects by technical field and by other indicators provide sub-groups of sufficient size for statistical analysis of the acceptance of open science. The primary focus was on the timely evolution open science by cluster, which turned out to be not feasible.

WP3 uses the services of WP6 (Networking, Dissemination & Exploitation) in order to spread publishable results to the research community and to attract project consortia for cooperation with OSCAR. The OSCAR consortium will select about 20 target projects, which agree to contribute to OSCAR within the framework of a non-disclosure agreement (NDA). Consortia will be interviewed on their experience with and expectations of open science in general, and how to implement open science in concrete projects. Practical hands-on experience will reveal opportunities and drawbacks. In addition, projects dealing with other transport modes, inter-modality and projects affecting indirectly AAT research shall be considered. WP3 will both address researchers executing these projects and administrative staff, i.e. representatives of the legal and the financial departments. Practical experience confirms – especially in medium and large organisations – the different points of view of researchers and administrative staff.

2.3.2 Step 2: Development of a preliminary code of conduct and considerations of legal constraints

WP4 mainly deals with the development of the OSCAR open science code of conduct. In this second step, we are iteratively developing the methodology and conceptual framework for the open science code of conduct as well as the open science code of conduct itself. Step 1 so far (2020-07-13) gave insights into the level of understanding and acceptance of open science, its potential perceived conflicts with IPR within the AAT research projects. Step 1 also showed some important aspects of the open science community, i.e. plurality of platforms, data formats,

practices, its dynamic development etc. These early outcomes are a good information base to build the further development of our open science code of conduct on.

One early outcome of WP4 will be an overview of the legal and contractual framework regarding open science and IPR in European AAT research projects. This overview will address rights and obligations related to open science in conjunction aspects of IPR protection and competitiveness. Current grant agreement (GA) and CAMs deal – amongst other – with IPR protection issues. Thus, a practical implementation of open science should address those CAMs and should demonstrate compatibility of open science and conventional contracts in the project context. It shall be emphasized that the OSCAR consortium is *not* mandated to change these models. We may provide recommendations only on how open science and the open science code of conduct can be harmonised with conventional contractual practices within the European AAT research landscape. The remaining calls in Horizon 2020 and the preparation of FP9 together with the time schedule of OSCAR indicate that efforts should be spent on FP9.

The main goal of WP4 is to arrive at a short, clear and easy to use open science code of conduct for the European AAT research community. This open science code of conduct will be tailored for the implementation in European AAT research projects by addressing the specific requirements of the AAT field.

In **WP2** current CAMs regarding their compatibility with open science have been systematically analysed. The analysis showed that CAMs are indeed compatible with open science. For more information on this analysis, please refer to deliverable D2.3.

OSCAR is developing the first open science of conduct in the field of AAT research. The code of conduct aims to be short, clear and easy to use with all European AAT research projects. It should help researchers and engineers to integrate open science in their daily work. Also, recommendations and guidelines on how to implement open science when reasonable shall be developed.

2.3.3 Step 3: Demonstration & validation

WP5 dealing with **Demonstration and Validation of the OSCAR open science code of conduct in Pilot Projects** is closely interacting with WP4 in order to feedback experiences with interim WP4 results gathered in pilot projects. The iterative process will start with H2020 projects running at that time in which the application of the draft open science code of conduct will be simulated. OSCAR aims to answer the questions: Which impact of both the deliberation on the legal framework and on the code of conduct will be expected? Which suggestions will seem to be acceptable, which objections – be it regarding contractual aspects or regarding practical application – may come up? WP5 provides these answers to WP4 in order to develop more mature versions of the code of conduct and of a set of recommendations for future CAMs. Once the partners agree on an acceptable level of maturity, OSCAR aims at a test implementation in at least one suitable project, ideally in one of each category of RIA, IA, CSA. The support of the European Commission services will likely be needed to achieve this ambitious goal, i.e. to identify such project(s) at an early stage of preparation.

2.4 Objectives and tasks of OSCAR WP4, legal and contractual constraints and the OSCAR code of conduct

The focus of WP4 is the development of the OSCAR open science code of conduct for the European AAT research projects and its implementation into legal frameworks in the EU project landscape. WP4 consists of 5 Tasks and corresponding deliverables.

2.4.1 T4.1 Analysis of WP2 and WP3 results to identify state of the art, challenges, legal and contractual constraints and opportunities for implementing Open Science in AAT research (TL Fraunhofer IRB, M6 – M10)

In work packages WP2 and WP3 preliminary information on existing practices of and opinions on the application of open science in the European AAT research was systematically collected. In this task T4.1, the OSCAR consortium analysed the results of WP2 and WP3 as of 2020-07-13 with focus on the following aspects:

- Legal and contractual constraints for implementing open science in European AAT research landscape;
- Challenges for implementing open science in the European AAT research landscape;
- Opportunities for implementing open science in European AAT research landscape.

Based on the results of the analysis done in this task the OSCAR consortium derived measures to (a) implement open science in in the European AAT research landscape in general and (b) to tailor the development of the open science code of conduct in particular.

Deliverable D4.1 aggregates the results of D2.1, D2.3, D3.1 and D3.2 and derives key challenges, key opportunities as well as key actions for the implementation of open science in general and the OSCAR open science code of conduct in particular. The analysis supports the roadmap delivered with D4.2. Task T4.1 and the corresponding deliverable D4.1 strongly depended on the results of WP2 and WP3. The results from WP2 and WP3 were available later than planned. Due to these delays, the activities in task T4.1 took place not only from month 6 to month 10 as planned but from month 6 to month 19. Because of these delays, the D4.1 could also only be completed with a delay. Please see section 5 *Quality* for more information.

2.4.2 T4.2 Methodology & framework for the OSCAR code of conduct (TL Fraunhofer IRB, M8 – M11)

Based on

1. the analysis from T4.1,
2. the roadmapping workshop in November 2019 in Paris with ONERA, SAFRAN on the legal and contractual constraints and opportunities and
3. on a literature research on the theory and development of codes of conduct

The OSCAR consortium developed a road map and conceptual framework for the OSCAR open science code of conduct. This roadmap includes a detailed work breakdown structure, a Gantt chart and a maintenance and update pattern for the code of conduct (see D4.2).

The finalisation of deliverable D4.2 depended on the finalisation of deliverable D4.1 that was delayed due to delays in WP2 and WP3. Please see section 2.4.1 *Analysis of WP2 and WP3* above and section 5 *Quality*.

The first draft version of the code of conduct was prepared by December 2019. The OSCAR consortium discussed and improved the draft including the maintenance workflow.

2.4.3 T4.3 Iterative preparation of the OSCAR Code of Conduct and simulated application in pilot cases (TL Fraunhofer IRB, M12 – M18)

The OSCAR consortium understands the OSCAR open science code of conduct as a living document which will be continuously and iteratively improved in the further course of the project together with all project partners. Fraunhofer IRB continues incorporating new information and insights generated during the project into new versions of the code of conduct. The development of additional information material will be considered like:

- Specifics of knowledge generation and research projects in the AAT sector;
- Development of auxiliary information to enable the AAT community to implement open science and its advantages (like faster innovation cycles) in their research projects;
- User stories regarding potential implementation patterns of open science in the AAT sector and
- Fact sheets on the relation of IP and responsible research innovation (RRI) and open science.

It is planned to simulate the application of the open science code of conduct in selected pilot case projects. The simulation process envisaged consists of adapting existing documents stemming from the project context on a trial basis so that they contain or reference the open science code of conduct. Alternatively, we will obtain the relevant information via a short survey using the findings from this short simulation to further optimise the code of conduct.

The final version of the code of conduct (available towards the end of the project) will be a tailored open science code of conduct which is short, clear and easy to use.

To communicate the OSCAR open science code of conduct appropriate measurement like input to the general communication strategy and a dissemination plan (see WP6) will be developed along the way in close cooperation with activities in WP5 and WP6.

First results of T4.3 are delivered in deliverable *D4.3: First version of the Oscar Code of Conduct*.

2.4.4 T4.4 Preliminary integration of the OSCAR Code of Conduct in established Consortium Agreement models (TL Fraunhofer IRB, M14 – M16)

Consortium agreements (CAs) are legally binding contracts between all members of the consortium concerned that are essential in all European projects. These documents regulate the mutual work and exchange between the project partners with focus on confidentiality, protection of background and foreground IP in a given project. CAs concretizes the more generic rules of the respective GA. WP4.4 demonstrates exemplary how CA models may take the code of conduct into account grant agreement. Consortium agreement models (CAMs) are contract templates that a project consortium can use to simplify the contract preparation.

At the time the OSCAR project proposal was written, it was planned to incorporate the open science code of conduct into existing CAMs. Initially the following two subtasks were planned:

- ST4.4.1 Selection of pilot cases (RIA, IA, CSA): here adequate pilot case agreement models should have been selected by comprehensible criteria.

- ST4.4.2 draft modification of CA models: The CA should have been modified. The adopted agreement models should have been tested and reviewed by members of the forum.

During the project, this approach proved to be politically and organizationally unfeasible thus requiring an alternative approach.

All CAMs base on the work of legal services throughout the whole European research landscape (e.g. IMG4, DESCA, etc.) and far beyond the AAT research community, outlining the "translation" of Rules for Participation and Model Grant Agreements to the fully internal agreement of consortium partners in a concrete project. Considering this independence of all CAMs (and all working groups developing CAMs) from Commission Services, the OSCAR consortium suggests providing recommendations to the Commission Services which may be taken into account when updating participation rules respectively Model Grant Agreements. The CAMs are expected to be updated according to the Open Science constraints given with Horizon Europe Model Grant Agreements.

While the approach addresses European policy issues, the second activity works on level of concrete projects. Here, the applicability of the OSCAR Code of Conduct is simulated to understand the potential implementation of OS in concrete cases and the resulting impact.

Additional information material like fact sheets, FAQ, etc. that are incorporated into the general OSCAR communication strategy to promote and disseminate the code of conduct in the AAT community (see WP6).

The results of this task will be delivered with deliverable *D4.4: Modified Consortium Agreement Models*.

2.4.5 T4.5 Finalization of the OSCAR Code of Conduct V.1.0 and the modified Consortium Agreement models on basis of WP5 results (TL INCAS, M24 – M28)

By incorporating the feedback and insights from all the other activities within the OSCAR project including legal advice, the final version of the open science code of conduct will be prepared by Fraunhofer IRB. The code of conduct will then be communicated and disseminated according to our general communication strategy developed in WP6. The results of this task will be presented in deliverable *D4.5: Final version of the Oscar Code of Conduct.*

The result of D4.3 is the first pilot case version of the open science code of conduct for the AAT research sector. The pilot case version is one precondition for WP5. In addition, D4.3 includes the simulated application of the code of conduct in EU projects.

D4.4. will demonstrate how the integration of the open science code of conduct into Consortium Agreement Models could look like. This is done in two steps: first, the CAMs most relevant to European AAT research are identified and the code of conduct is adopted by customizing the CAM. As mentioned above, OSACR will not intervene in the CA maintenance process but provide results of the analyses to the Commission Services.

The result of D4.5 represents the main objective of the work package to provide an applicable open science code of conduct for future European research projects in the AAT sector.

2.5 Relevance and contribution of the deliverable to the objectives of OSCAR

The main goal of the OSCAR project is to foster open science and to facilitate the implementation of open science into the European (AAT) research landscape. To achieve this goal, the OSCAR team develops tailored open science opt-in, opt-out or hybrid application models and delivers them to the stakeholders in the fields of AAT.

Therefore, the status of open science in European AAT research landscape (deliverable D2.1) and particularly existing CAMs (deliverable D2.3) have been analysed. In parallel a bibliographic analysis of open access (as a prominent part of open science) within the AAT sector and their current publication topics has been performed. The exchange with the AAT research community (*The Forum*) is part of WP3.

The OSCAR project aims (a) *to research the current state of open science in the European aeronautics and air transport (AAT)* research landscape and (b) to implement open science into the European AAT research landscape. To reach the second goal of the OSCAR project we aim to achieve the following two things. First, we want to develop an open science code of conduct for the European AAT research landscape. Second, we want to harmonise the main topics of this open science code of conduct not only with the consortium agreement models (CAMs) used in this field but also with other current contractual practices in the AAT field. We got considerable insights into the possible ways on how to harmonise our code of conduct with current practices in the AAT field via the deliverable D4.1.

The current deliverable D4.2 and the corresponding tasks and activities are an important step towards the main objective of the OSCAR project, i.e., developing an open science code of conduct and implementing it into the current landscape of the European AAT research. To achieve this main goal, we need to have a clear understanding on how we want to arrive at a reasonable and maintainable open science code of conduct. The current deliverable lays out the roadmap for *developing, deploying and maintaining an open science code of conduct*. The roadmap for the open science code of conduct makes clear the necessary steps and key objectives.

3 Approach and procedure

3.1 Work performed

3.1.1 Early development of the roadmap

Right at the beginning of the project, an initial roadmap was developed, based on the information available up to that point. The development of the open science code of conduct is the core of work package 4 (WP4). The largest part of the roadmap including a detailed work breakdown structure was ready in May 2019. All files belonging to this roadmap can be viewed in the attachment (zip file) to this deliverable.

3.1.2 Work packages and time plan for developing the open science code of conduct

We developed a comprehensive time plan (schedule), a Gantt chart for the development of the code of conduct. The full list can be seen in Figure 1, 2 and 3. The corresponding files can be found in the zip file in the attachment of this deliverable. The development of our open science code of conduct has the following three phases:

1. The **alpha** phase;
2. The **beta** phase;
3. The **release** phase.

All three phases can be seen in detail in Figures 4 and 5. In the alpha phase of the development of the open science code of conduct, a first prototype will be created. In addition, this prototype will be used to test the compatibility of the open science code of conduct with the existing consortium agreement models. Further additions to the code of conduct will be made if necessary.

In the beta phase we harmonise our code of conduct with the existing CAMs as well as with the feedback from the consortium and adapt the code of conduct accordingly and incrementally.

In the release phase we will correct critical issues and errors and finalise the code of conduct so that it can be released to the public. The Gantt chart can be seen in Figure 4 and 5.

ID	THEMA	BEGINN	ENDTERMIN	ZUGEWIESEN AN
47	WP4, Legal and contractual constraints and the OSCAR Code of Conduct	28.06.2019	01.04.2021	IRB
59	Alpha phase	28.06.2019	04.05.2020	IRB
73	T4.1, Analysis of WP2 and WP3, legal challenges and opportunities of i...	28.06.2019	01.10.2019	IRB
77	IRB performs initial analysis of WP2 and WP3	28.06.2019	28.06.2019	IRB
76	IRB delivers questionnaire to EASN-TIS	01.07.2019	01.07.2019	IRB
79	ONERA delivers report on identified national and European partners...	01.08.2019	01.08.2019	ONERA
78	IRB organises conference call; EASN-TIS provides answers to the qu...	01.08.2019	01.08.2019	IRB
80	IRB organises workshop for ONERA and SAFRAN; ONERA and SAF...	27.09.2019	27.09.2019	IRB
81	IRB delivers analysis of survey results of WP2 and WP3 (D4.1)	01.10.2019	01.10.2019	IRB
72	T4.2, Framework for Code of Conduct	28.09.2019	29.11.2019	IRB
82	IRB delivers questionnaire to EASN-TIS	28.09.2019	28.09.2019	IRB
83	IRB organises conference call; EASN-TIS provides answers to the qu...	29.09.2019	29.09.2019	IRB
107	IRB delivers the Roadmap to Code of Conduct to OAB and OAB and ...	04.11.2019	04.11.2019	IRB

Figure 1: Gantt chart overview part 1

85	OAB delivers a review of the Roadmap to Code of Conduct to IRB	29.11.2019	29.11.2019	OAB
106	ONERA delivers review of the Roadmap to Code of Conduct to IRB	29.11.2019	29.11.2019	ONERA
114	T4.4, Integration the Code of Conduct draft into the Consortium Agree...	02.12.2019	04.05.2020	IRB
115	ST4.4.1, Selection of pilot case Consortium Agreement Models (IRB)	02.12.2019	03.02.2020	IRB
125	EASN-TIS delivers commented list of 10 pilot case Consortium A...	02.12.2019	02.12.2019	EASN-TIS
117	IRB delivers selection of 3 pilot case Consortium Agreement Mod...	03.02.2020	03.02.2020	IRB
116	ST4.4.2, Modification of pilot case Consortium Agreement Models (I...	02.03.2020	04.05.2020	IRB
119	IRB delivers testing integration of the Code of Conduct into the 3...	02.03.2020	02.03.2020	IRB
124	SAFRAN delivers review of the testing integration of the Code of...	30.03.2020	30.03.2020	IRB
120	IRB delivers preliminary integration of the Code of Conduct draft ...	04.05.2020	04.05.2020	IRB
50	T4.3, Iterative implementation, Code of Conduct, simulated application i...	02.12.2019	04.05.2020	IRB
86	IRB delivers draft of the Code of Conduct to OAB	02.12.2019	02.12.2019	IRB
87	OAB review of the draft of the Code of Conduct to IRB	13.01.2020	13.01.2020	OAB
89	IRB delivers first version of the Code of Conduct to ONERA and SAF...	01.04.2020	01.04.2020	IRB
95	ONERA delivers review of the first version of the Code of Conduct t...	04.05.2020	04.05.2020	ONERA
60	Beta phase	02.06.2020	27.01.2021	IRB

Figure 2: Gantt chart overview part 2

54	IT4.1, Incremental adaption of the Consortium Agreement Models	02.06.2020	02.11.2020	IRB
96	SAFRAN delivers preliminary report on the assessment of the RIA, I...	02.06.2020	02.06.2020	SAFRAN
97	SAFRAN delivers interim report on the assessment of the RIA, IA, CS...	03.08.2020	03.08.2020	SAFRAN
121	IRB delivers pre-final of the modified Consortium Agreement Models...	01.09.2020	01.09.2020	IRB
123	SAFRAN delivers review of the pre-final modified Consortium Agree...	01.10.2020	01.10.2020	SAFRAN
102	IRB delivers modified Consortium Agreement Models to EASN-TIS (...	02.11.2020	02.11.2020	IRB
55	IT4.2, Incremental adaption of the Code of Conduct	30.09.2020	27.01.2021	IRB
122	IRB delivers interim version of the Code of Conduct to SAFRAN	30.09.2020	30.09.2020	IRB
99	SAFRAN delivers recommendations for modifications in the develop...	01.10.2020	01.10.2020	SAFRAN
100	IRB delivers pre-final Code of Conduct to INCAS	27.01.2021	27.01.2021	IRB
74	Release phase	10.02.2021	01.04.2021	IRB
75	T4.5, Finalisation of Code of Conduct (INCAS)	10.02.2021	01.04.2021	IRB
101	INCAS delivers improvements of the pre-final Code of Conduct to IR...	10.02.2021	10.02.2021	INCAS
104	IRB organises workshop on our main results and key insights for ON...	10.02.2021	10.02.2021	IRB
103	IRB and INCAS delivers final version of the OSCAR Code of Conduct...	01.04.2021	01.04.2021	IRB
57	M4.1, Final version of the OSCAR Code of Conduct, IRB	01.04.2021	01.04.2021	IRB

Figure 3: Gantt chart overview part 3

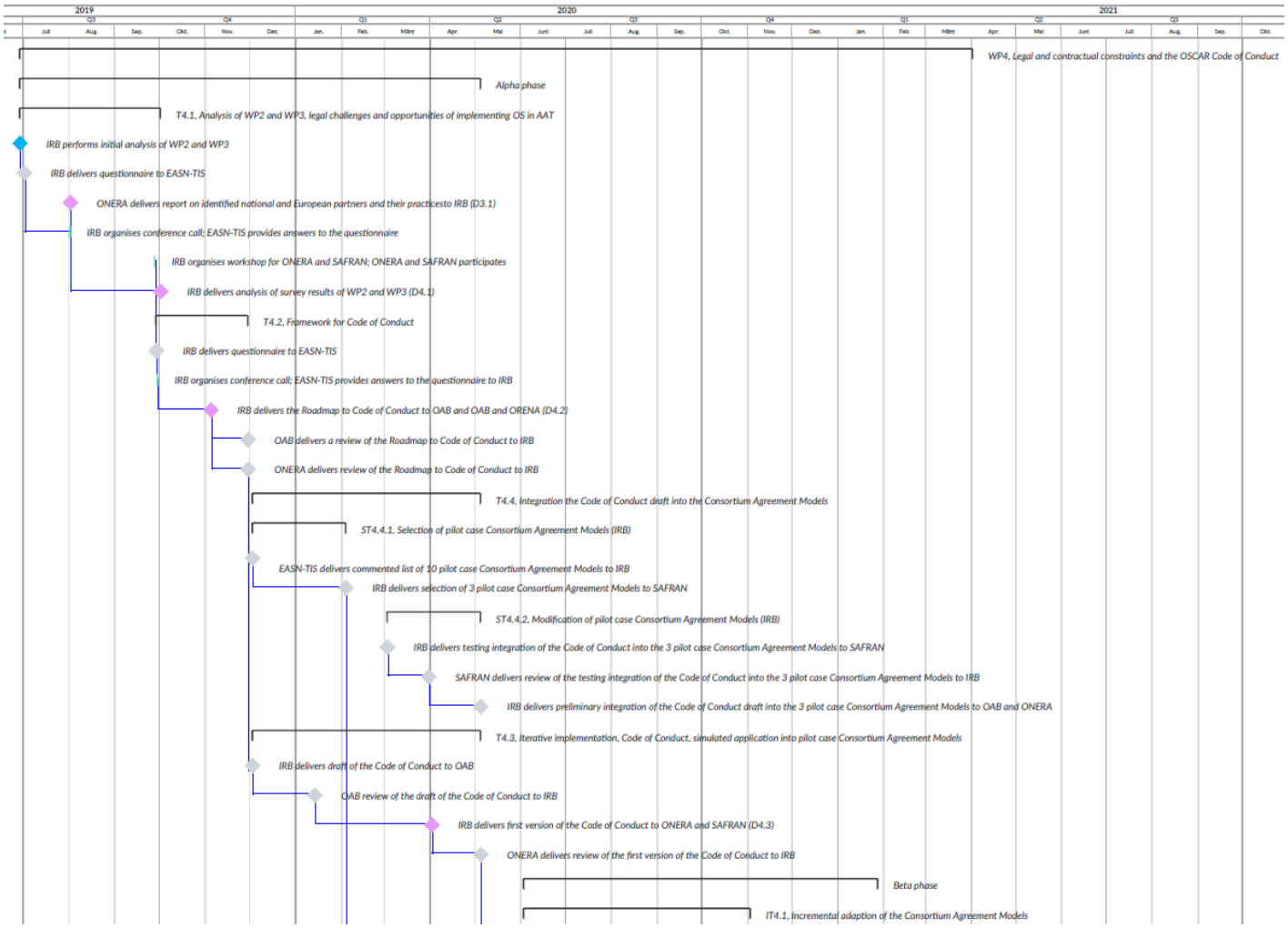

Figure 4 Gantt chart, code of conduct, alpha phase

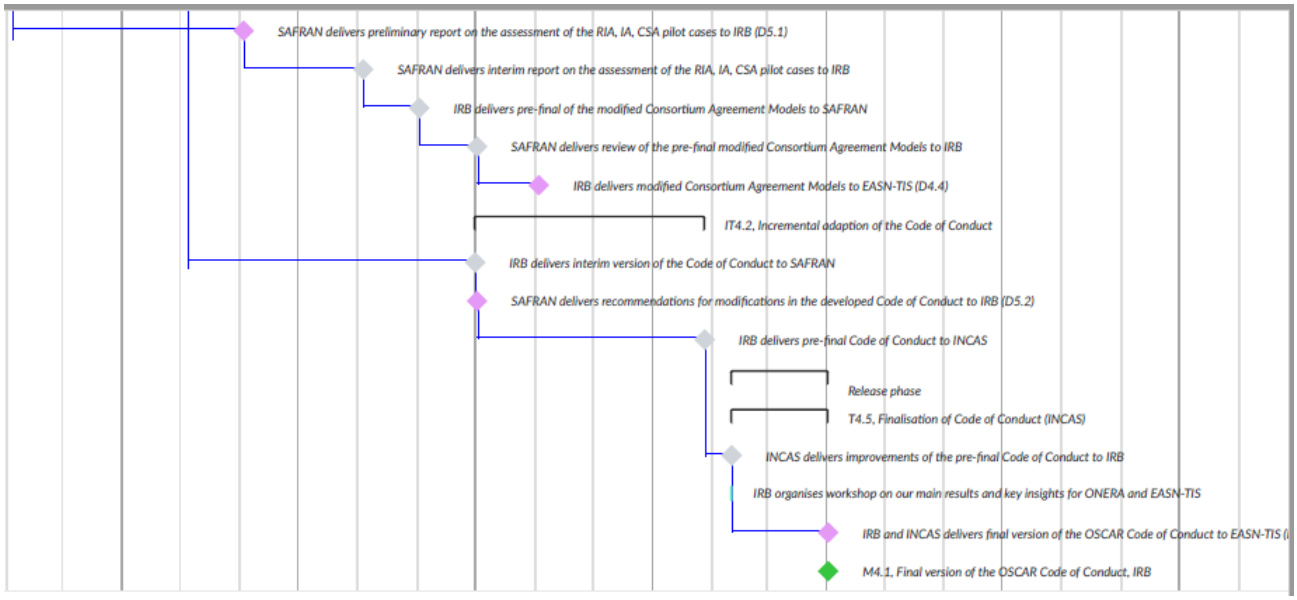

Figure 5: Gantt chart, code of conduct, beta and release phase

4 Results

4.1 Tasks, subtasks and critical paths

In this section, we describe the necessary interactions between the partners and the critical path of the individual tasks. Some of the more fine-grained subtasks or internal tasks are not foreseen in the proposal.

4.1.1 T4.1 Analysis of WP2 and WP3 results to identify state of the Art, challenges, legal and contractual constraints and opportunities for implementing Open Science in AAT research (TL Fraunhofer IRB, M6 – M10)

In task T4.1, Fraunhofer IRB analysed the results of WP2 and WP3.

The interactions 76 and 78 were dropped in favour of the workshop with IRB, ONERA and SAFRAN as described in section *4 Roadmapping workshop on the legal constraints of a code of conduct.*

T4.1					
ID	**Action Flow**	**Assignment**	**Type**	**Date**	**Status (2020-07-22)**
77	Fraunhofer IRB performs initial analysis of WP2 and WP3	Fraunhofer IRB	Internal Milestone	28.06.2019	Achieved
76	Fraunhofer IRB delivers questionnaire on the AAT landscape to EASN-TIS	Fraunhofer IRB	Contribution	01.07.2019	Dropped in favour of workshop, see ID 80
78	Fraunhofer IRB organises conference call; EASN-TIS provides answers to the questionnaire on the AAT landscape	Fraunhofer IRB	Event	01.08.2019	Dropped in favour of workshop, see ID 80
79	ONERA delivers report on identified national and European partners and their practices to Fraunhofer IRB (D3.1)	ONERA	Deliverable	01.08.2019	Delivered
80	Fraunhofer IRB organises workshop for ONERA and SAFRAN; ONERA and SAFRAN participates	Fraunhofer IRB	Event	27.09.2019	Took place in November 2019
81	Fraunhofer IRB delivers analysis of survey results of WP2 and WP3 (D4.1)	Fraunhofer IRB	Deliverable	01.10.2019	Delivered

4.1.2 T4.2 Methodology & framework for the OSCAR Code of Conduct (TL Fraunhofer IRB, M8 – M11)

In task T4.2, The OSCAR consortium performs preliminary and conceptual tasks concerning the methodology and framework for the code of conduct.

The interactions 82 and 83 were dropped in favour of the workshop with IRB, ONERA and SAFRAN as described in section *4 Roadmapping workshop on the legal constraints of a code of conduct.*

T4.2					
ID	**Action Flow**	**Assignment**	**Type**	**Date**	**Status (2020-07-22)**
82	Fraunhofer IRB delivers questionnaire on the proposed Code of Conduct framework to EASN-TIS	Fraunhofer IRB	Contribution	28.09.2019	Dropped in favour of workshop, see 80
83	Fraunhofer IRB organises conference call; EASN-TIS provides answers to the questionnaire on the proposed Code of Conduct framework to IRB	Fraunhofer IRB	Contribution	29.09.2019	Dropped in favour of workshop, see 80
107	Fraunhofer IRB delivers the Roadmap to Code of Conduct to consortium and consortium (D4.2)	Fraunhofer IRB	Deliverable	04.11.2019	Delivered
85	Consortium delivers a review of the Roadmap to Code of Conduct to Fraunhofer IRB	OAB	Contribution	29.11.2019	Workaround: we use the entire consortium to give feedback
106	ONERA delivers review of the Roadmap to Code of Conduct to Fraunhofer IRB	ONERA	Contribution	29.11.2019	We use the entire consortium to give feedback

4.1.3 T4.3 Iterative preparation of the OSCAR Code of Conduct and simulated application in pilot cases (TL Fraunhofer IRB, M12 – M18)

Based on the results, insights and feedback of all activities, the Code of Conduct is developed incrementally. In this task, we rely on the contributions of and the mutual exchange with the OSCAR partners and especially with SAFRAN.

Please note that T4.3 changed considerably. For the changes and the new approach, please see section 2.4.3.

Instead of using confidential project documents and contracts, IRB will now use documents from the context of European AAT research projects and/or information obtained by a short survey, to optimize the open science code of conduct.

The adopted documents (if any) and / or the results from the short survey will be incorporated into the current code of conduct until the end of 2020.

T4.3 takes the following aspects into consideration:

1. Specialties of knowledge generation in the AAT sector regarding the implementation of Open Science concepts.
2. Development of auxiliary information to enable the collaboration partners to identify, value and reuse open research results (publications, data and software) to increase the knowledge/technology transfer into AAT innovation processes.
3. Development of scenarios regarding the exploitation of the research results for the questions: When does it make sense to open or to protect the results or even to combine the two concepts to take full advantage of their economic potential and maximize their impact on science, economy and where applicable on politics and society.

For approval, we will consult the OSCAR Advisory Board. After testing and adoption, the approval of a pilot case version of the Oscar COC takes place.

T4.3					
ID	**Action Flow**	**Assignment**	**Type**	**Date**	**Status (2020-07-22)**
86	Fraunhofer IRB delivers draft of the Code of Conduct to the project consortium	Fraunhofer IRB	Contribution	02.12.2019	Delivered
87	Consortium review of the draft of the Code of Conduct to Fraunhofer IRB	OAB	Contribution	13.01.2020	Internal feedback workshop took place on 2020-07-08
89	IRB delivers first version of the Code of Conduct to consortium (D4.3)	Fraunhofer IRB	Deliverable	01.04.2020	Delivered
95	Consortium reviews of the first version of the Code of Conduct to Fraunhofer IRB	ONERA	Contribution	04.05.2020	Postponed, end of September 2020

4.2 Key findings for the development of the OSCAR open science code of conduct

The European aeronautic and air transport (AAT) research landscape is rather complex. In D2.1 the OSCAR consortium prepared an overview map of relevant networks, events and stakeholder in the AAT field. This is also the target audience to communicate the OSCAR open science code of conduct.

The analysis of the most relevant CAMs in the European AAT research landscape, performed in D2.3, showed that *open science and its underlying conceptual framework is indeed compatible with the currently used CAMs*. Furthermore, this analysis has also shown that there are a few promising candidate categories of open science, which in the OSCAR open science code of conduct are expected to work well with the current AAT contract practice. Those promising categories of open science are:

1. Open source software,
2. Open data,
3. Copyright and licensing,
4. Intellectual property and
5. Ethics and responsibility.

Interestingly, digitalisation in terms of hardware and software infrastructure as a key driver of open science and also as a key driver of modern research does not seem to be relevant in the analysed CAMs. This could be a blind spot of the European AAT community and it should be addressed, because it is a very important megatrend. In addition, and in agreement with the other results deliverable D3.1 showed that open access publications are more visible – also in the AAT sector.

The preliminary results of the AAT community surveys on open science, which are conducted in WP2, point in a similar direction.

Currently only the one of the many categories of open science is directly addressed in the GAM namely the subcategory open access. Hence, we came to the conclusion that open science should not only be fostered in the context of CAM development, but also in the Rules of Participation (RfP) and the Grant Agreement Model (GAM), on which the CAMs are based. This means that we have to work closely together with the European Commission and similar policy makers in the AAT community.

In general, with the insights of the analysis of our results so far (see deliverable D4.1) we can directly derive the following four main elements for our roadmap:

- We need additional information material on open science tailored especially for the AAT community;
- Our code of conduct needs to be short, easy to apply and should come in the style of a opt-in, opt-out or hybrid model;
- Our code of conduct should embrace current best practices and already used concepts within the open science as well as the AAT community;
- Extension of the communication activities, to create incentives and clear rules (see also Méndez (2019)) in close cooperation with the European Commission and the leaders of WP5 and WP6.

For an in-depth analysis of our results so far as well as the conclusions and implications drawn from those results, please consult the deliverable D4.1 *Analysis of WP2 and WP3.*

4.3 Maintenance workflow and update pattern

An open science code of conduct requires the feedback from the research community addressed, thus supporting a maintenance workflow keeping the code of conduct up to date. The workflow has to consider legal constraints as e.g. from the European Union and from the Member States. Also, the implementation of the code of conduct in practise – in European AAT research projects – must be taken into account. The challenge is to keep such a maintenance workflow established beyond the lifetime of OSCAR as a Horizon 2020 research project including the infrastructure necessary to operate the maintenance workflow. Figure 6 presents the workflow concept.

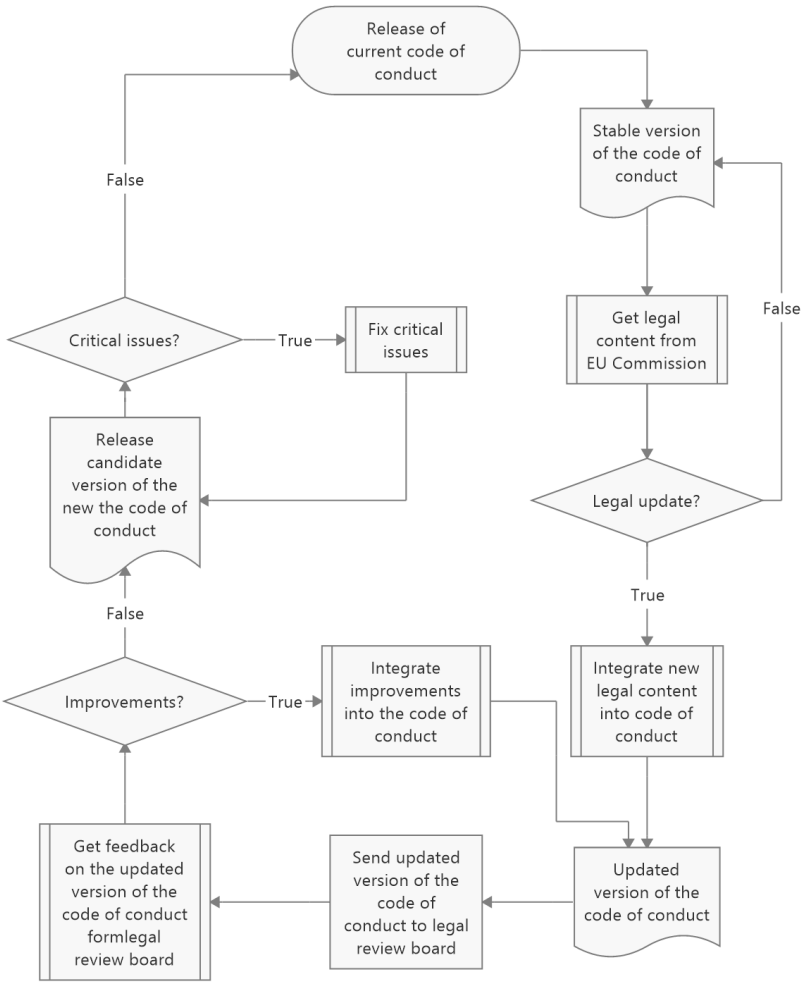

Figure 6: Open science code of conduct maintenance workflow and update pattern

5 Quality

5.1 Comparison of planned activities and performed work

The originally prepared roadmap for the development of the OSCAR open science code of conduct could not be proceeded according to the OSCAR plan, mainly because of delays of WP2 and WP3. At first, requested access to EC databases (eCORDA) was not granted resulting in time consuming efforts to compensate this unavailability of well-structured data. At second, the forum approaches (internet-based forum) didn't provide results as planned, while the new approach using relevant aerospace events for F2F meetings and workshops had to be cancelled due to still ongoing COVID-19 pandemic.

6 Conclusions

Based on the results of the deliverable D4.1 and on the results of the roadmapping workshop on the legal constraints in November 2019 in Paris with Fraunhofer IRB, ONERA and SAFRAN (see D4.1) we were able to develop a solid roadmap for our open science code of conduct.

The key elements of the roadmap are:

1. **Lessons learned**: identification and incorporation of lessons learned from other code of conduct projects.
2. **Best practices**: identification of and commitment to best practices using de facto standards of existing code of conduct projects.
3. **Maintenance workflow**: being a living document the OSCAR open science code of conduct should be accompanied by a maintenance concept beyond the duration of the OSCAR project.
4. **Opt-in, opt-out model**: the OSCAR consortium suggests developing a legal framework for clean, simple, flexible opt-in, opt-out models for integrating open science in European AAT research projects. Potentially this could become a model to be implemented also on national lvel.
5. **Additional information material**: further information material like fact sheets about open science will be prepared and submitted to WP6 (D&E).

7 References

Creative Commons. 2020. https://creativecommons.org/.

European Association of Research and Technology Organisations (EARTO). 2014. The TRL Scale as a Research & Innovation Policy Tool, EARTO Recommendations. https://www.earto.eu/wp-content/uploads/The_TRL_Scale_as_a_R_I_Policy_Tool_-_EARTO_Recommendations_-_Final.pdf.

European Commission. 2020. *European open science Cloud (EOSC)*. https://www.eosc-portal.eu/.

European Commission. 2016b. Open innovation, Open Science, open to the world. A vision for Europe. Brussels: European Commission, Directorate-General for Research and Innovation. ISBN: 978-92-79-57346-0 DOI: 10.2777/061652. Available at: http://bookshop.europa.eu/en/open-innovation-open-science-open-to-the-world-pbKI0416263/.

European Commission. 2020c. Data management. https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/data-management_en.htm.

Méndez, Eva. 2019. '"open science?… Darling, We Need to Talk!" | EInfra Central'. 2019. https://einfracentral.eu/news/open-science-darling-we-need-talk.